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1. Your reference — TJF/JY/33128 — **0010272.3**

2. Patent application number — 27 APR 2000
(The Patent Office will fill in this part)

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

WESTWIND AIR BEARINGS LTD
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BH16 6LN

Patents ADP number *(if you know it)* 6348536001

If the applicant is a corporate body, give the country/state of its incorporation — UNITED KINGDOM

4. Title of the invention — MANUFACTURE OF DATA STORAGE DEVICES

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

fJ CLEVELAND
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WC2A 1JQ

Patents ADP number *(if you know it)* 07368855001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

YES

Patents Form 1/77

Manufacture of data storage devices

This invention relates to the manufacture of data storage devices such as magnetically and optically written discs. Examples are hard and floppy magnetic discs as used in personal computers where the data is written in magnetically as well as CD ROMs which normally have data written in optically, i.e. usually by laser beam.

The invention relates specifically to the stage of manufacture of the storage device where indexed tracks or sectors are created. These are necessary so that the data recording and reproducing systems can identify the location of data put into and read out from the storage device. Moreover for high quality performance these indexed tracks or sectors have to be very accurately provided on the storage device.

This manufacture involves separate stages wherein the media is examined (certified) and written to (servo written). Current practice requires separate discrete pieces of equipment to perform these tasks at separate stages of manufacture.

The tasks all require the rotation of the media disc with extreme quality of motion while magnetic or other heads and sensors are moved across the surface with controlled motion, positional relationships and geometry. In this regard there are normally two separate units, one of which, generally referred to as a servo-writer writes the sectors to the disc, and the other, generally referred to as a verifier, reads and verifies the disc.

The aim of this invention is to provide a particularly accurate and simple arrangement for performing these tasks, and accordingly the invention provides a single platform with the ability to carry all the systems required to perform these tasks, particularly to both write and verify the sectors, at one stage within the manufacturing process.

Accordingly one aspect of the invention comprises a single monolithic support platform, a rotary carrier arranged for rotation of a media disc supported on said platform, a write head arranged for substantially radial movement relative to said carrier and for servo writing of data to said media disc and a certifier head arranged for substantially radial movement

relative to said carrier and for verification of the media disc.

For the ultimate in quality of motion some or preferable all such motion systems should be carried on air bearings. In a preferred construction the mountings for all of these air-bearing systems should be a single and solid component incorporating the maximum rigidity providing a common datum for each discrete process.

Accordingly a preferred form of the present invention utilises a single body to carry all the air bearing systems required to perform all the processes needed for the media to be installed in a disc drive or other data storage device. All motion systems thus contained can then be capable of simultaneous operation.

Respective drive means are typically provided for driving each of the moving components, namely, the rotary carrier, the write head and certifier head. One or more of the drive means may comprise an integrated motor which is arranged for directly driving a rotary spindle, or other member, supporting the respective component. Providing integrated drive means eases

manufacture and alignment of the constituent parts of the device.

One or more of the drive means may be an indirect drive means comprising a motor which is mounted independently of the respective component, and coupling means for transferring the drive to the respective component whilst minimising the transmission of any undesirable vibration. In some embodiments, the coupling means may be a resilient coupling means disposed in substantially axial alignment with a rotary spindle of the respective component. In other embodiments, the coupling means may comprise a drive belt.

It is particularly preferred that indirect drive means are provided for driving the rotary carrier carrying the media disc. The use of indirect drive means can allow substantial mechanical isolation of the motor from sensitive parts of the device. In particular, the indirect drive can help to prevent harmful vibrations being transmitted to the media disc or the servowriter head, which might otherwise cause track errors.

Embodiments of invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows a perspective view of a combination magnetic disc servowriter and certifier platform;

Figure 2 is a schematic side view of part of the platform shown in Figure 1, the platform being partly shown in section; and

Figure 3 is a schematic side view of part of an alternative platform, the alternative platform being partly shown in section.

Referring particularly to Figure 1, in a first embodiment, a common monolithic platform 1 is provided in the form of a single piece of material integrally forming a base support for three separate air bearing motion systems thereby guaranteeing the positional relationship of each to the media being processed. This media in the form of a magnetic disc 2 is mounted on a motorised spindle 5 with integral position feedback and disc clamping.

A servowriting headstack 3 is mounted on a rotary spindle carried by an air bearing and is geometrically positioned in relation to the media spindle 5 so as to mimic the final data storage product take off read-rotation relationship. It is fitted with an integral accurate motion actuator and fittings for a separate position sensor.

A certifier headstack 4 is mounted on a linear air-bearing supported slide with integral linear motor and fittings for a separate position sensor. However, this motion system could also be of rotary design.

Figure 2 is a schematic side view of part of the device shown in Figure 1, part of the platform 1 being shown in section to more clearly show the motorised spindle 5 used for carrying the magnetic disc 2. The magnetic disc 2 and selected other parts of the device are omitted in Figure 2 for the sake of simplicity.

The motorised spindle 5 generally comprises a rotary spindle or shaft 51 mounted in an air bearing 52 for rotation and axially supported by an axial bearing 53. Rotational drive of the rotary spindle 51 is provided by an integral motor. The integral motor comprises a

stator 54 and a rotor 55 which carries a plurality of permanent magnets 56 and which is formed integrally with the rotary spindle 51. Thus a direct drive is provided to the rotary carrier of the magnetic disc 2.

Figure 3 is a schematic side view of part an alternative embodiment. The alternative embodiment is similar to that described above except that the rotary carrier of the magnetic disc is indirectly driven. Again, in Figure 3, part of the platform 1 is shown in section to more clearly show the motorised spindle 5, whilst the magnetic disc 2 and selected other parts of the alternative device are omitted for the sake of simplicity.

In the alternative embodiment, the motorised spindle 5 similarly comprises a rotary spindle or shaft 51 mounted in an air bearing 52 for rotation and axially supported by an axial bearing 53. However rotational drive of the rotary spindle 51 is provided by an independent motor 6. The independent motor 6 is mounted independently of the rotary spindle 51. Drive is transferred to the rotary spindle by way of a pair of pulleys 61 and a drive belt 62. Thus an indirect drive is provided to the rotary carrier of the

magnetic disc 2 which can help to avoid undesirable vibrations being transmitted to the media disc or servo writing headstack.

In alternatives, a different form of drive coupling may be provided between an independent motor and the rotary carrier of the magnetic disc. This may take the form of a resilient solid or a fluid based coupling. Typically such a coupling will be disposed in alignment with both the axis of the rotary carrier and the axis of the motor.

In other alternatives, the independent motor in an indirect drive device can be mounted externally, and/or entirely independently of the monolithic platform block.

In further alternatives, one or more of the motion systems may not be of an air bearing design but some form of mechanical device.

In operation of any of the embodiments described above, a newly machined and finished disc or stack of discs will be loaded onto the media spindle disc clamp, after which the spindle will spin up to the

operating speed. Simultaneously the servowriting and certifier headstacks will start their motion allowing the integrity of the medium to be confirmed and the servo pattern to be written onto the disc. After this process the media will be ready for assembly into a disc drive or other data storage device. Using a device of the type described herein, it is possible to achieve track densities in the order of 40,000 tracks per inch.

CLAIMS:

1. A device for preparation of a media storage disc comprising a single monolithic support platform, a rotary carrier arranged for rotation of a media disc supported on said platform, a write head arranged for substantially radial movement relative to said carrier and for servo writing of data to said media disc and a certifier head arranged for substantially radial movement relative to said carrier and for verification of data on the media disc.

2. A device according to Claim 1 in which the rotary carrier, the write head and the certifier head are all carried on air bearing systems.

3. A device according to Claim 2 in which mountings for each of said air bearing systems are formed within said single monolithic support platform, thereby ensuring a common datum for both writing and verifying data on said disc.

4. A device according to any preceding claim comprising indirect drive means for driving the rotary carrier, the drive means comprising a motor mounted

independently of the rotary carrier, and coupling means for transmitting the drive to the rotary carrier whilst minimising the transmission of any undesirable vibration.

5. A device according to Claim 4 in which the coupling means comprises a resilient coupling means disposed in substantially axial alignment with the rotary carrier.

6. A device according to Claim 4 in which the coupling means is a drive belt.

7. A device according to any one of claims 1 to 3 comprising indirect drive means for driving the rotary carrier, the drive means comprising a motor mounted independently of the rotary carrier, and a drive belt for transmitting the drive to the rotary carrier.

8. A device according to Claim 2 or Claim 3 in which at least one of the air bearings comprises a rotary spindle, and associated indirect drive means is provided for driving the spindle, the drive means comprising a motor mounted independently of the respective spindle and coupling means for transmitting

the drive to the rotary carrier whilst minimising the transmission of any undesirable vibration.

9. A device according to Claim 2 or Claim 3 in which at least one of the air bearings comprises a rotary spindle, and associated indirect drive means is provided for driving the spindle, the drive means comprising a motor mounted independently of the respective spindle and a drive belt for transmitting the drive to the rotary spindle.

10. A device according to any preceding claim which is arranged for writing and verifying sectors of a hard or floppy magnetic disc or a CD Rom.

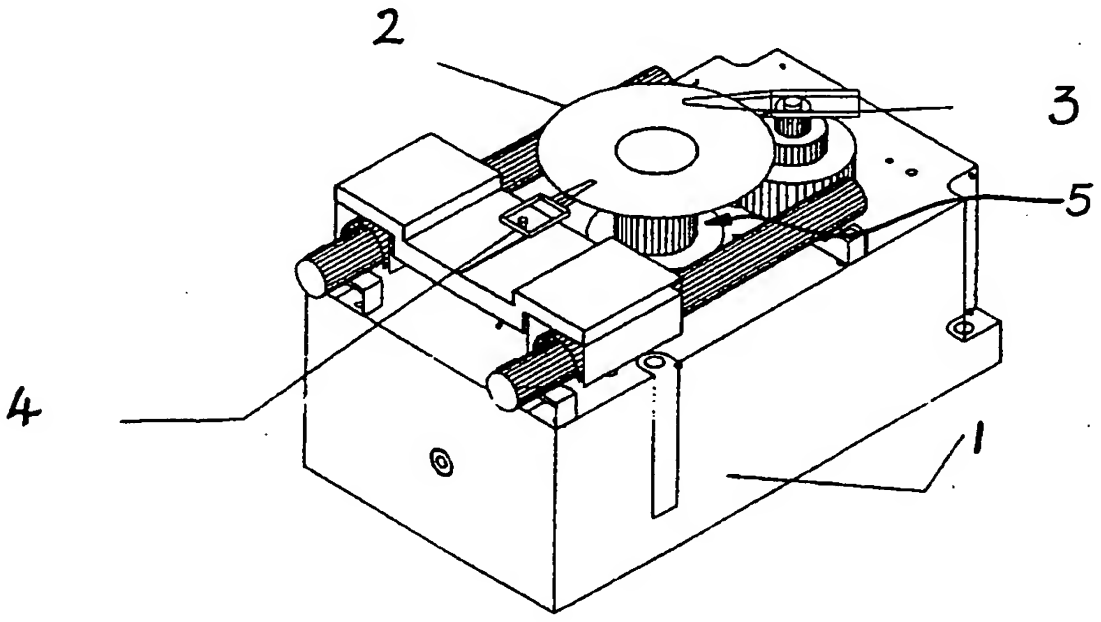

FIG. 1

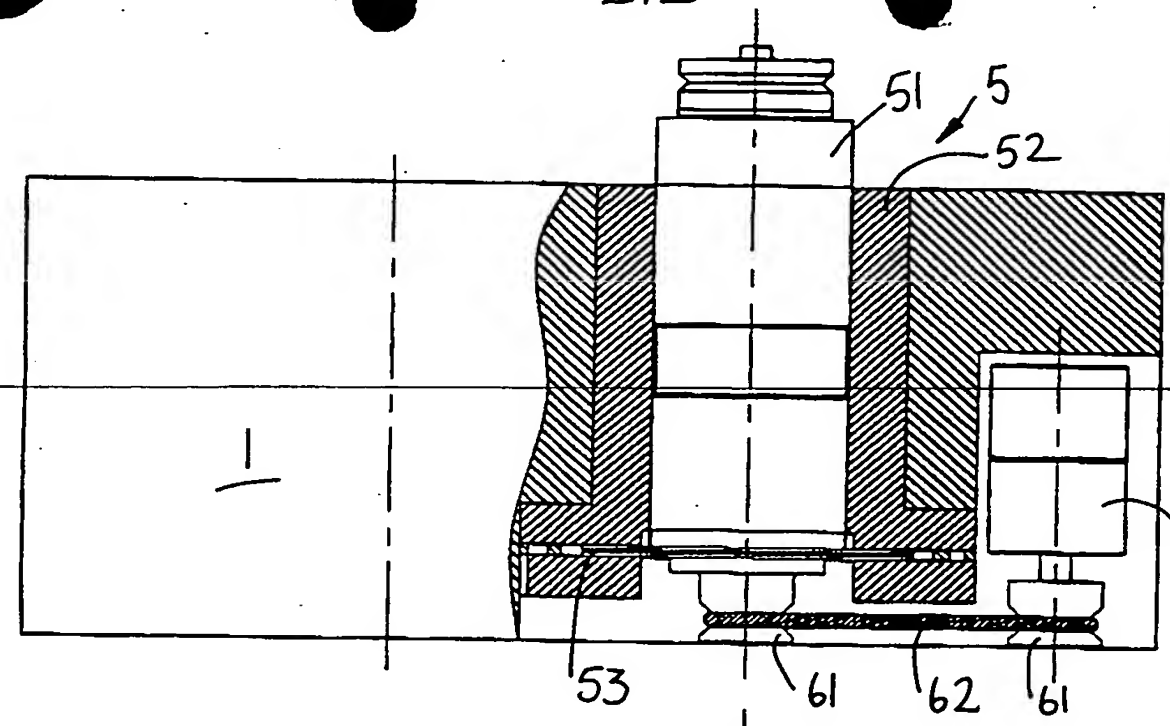

FIG. 3

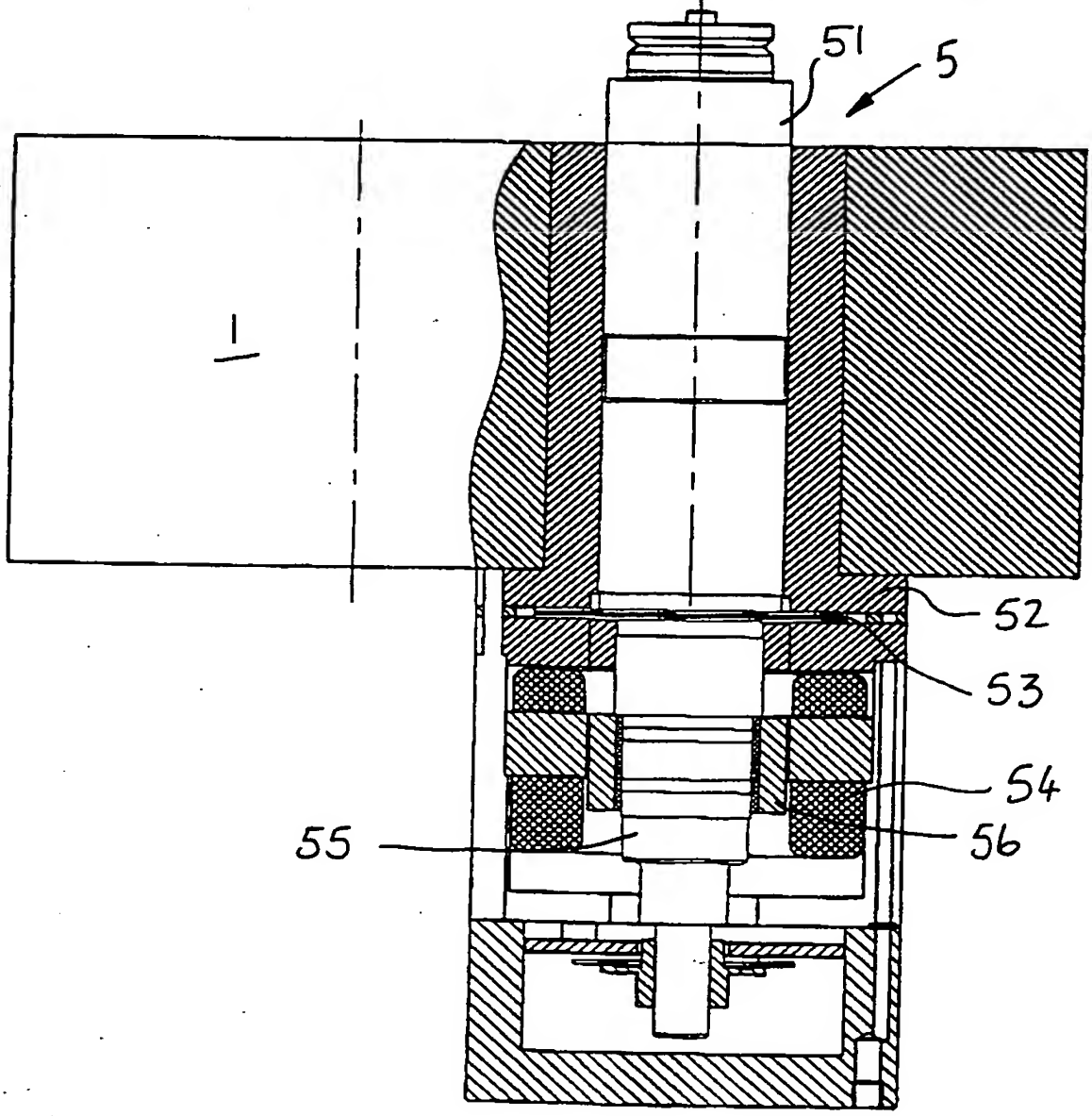

FIG. 2